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Trends in long-term care staffing by facility ownership in British Columbia, 1996 to 2006

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Abstract

Background

Long-term care facilities (nursing homes) in British Columbia consist of a mix of for-profit, not-for-profit non-government, and not-for-profit health-region-owned establishments. This study assesses the extent to which staffing levels have changed by facility ownership category.

Data and methods

With data from Statistics Canada's Residential Care Facilities Survey, various types of care hours per resident-day were examined from 1996 through 2006 for the province of British Columbia. Random effects linear regression modeling was used to investigate the effect of year and ownership on total nursing hours per resident day, adjusting for resident demographics, case mix, and facility size.

Results

From 1996 to 2006, crude mean total nursing hours per resident-day rose from 1.95 to 2.13 hours in for-profit facilities ($p=0.06$), from 1.99 to 2.48 hours in not-for-profit non-government facilities ($p<0.001$), and from 2.25 to 3.30 hours in not-for-profit health-region-owned facilities ($p<0.001$). The adjusted rate of increase in total nursing hours per resident-day was significantly greater in not-for-profit health-region-owned facilities.

Interpretation

While total nursing hours per resident-day have increased in all facility groups, the rate of increase was greater in not-for-profit facilities operated by health authorities.

Keywords

aged, frail elderly, geriatrics, geriatric nursing, homes for the aged, nursing care, nursing homes, nursing staff

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Long-term care facilities (nursing homes) provide housing, support and direct care to frail seniors who are unable to function independently. Nursing care in these facilities is provided by a combination of registered nurses (RNs), licensed practical nurses (LPNs), and resident care aides. Higher total nursing^{1,2} and RN^{3,4} hours per resident day have been associated with better care. Thus, nursing hours per resident-day is considered to be one reasonable measure of nursing home quality.⁵

Long-term residential care in Canada is delivered by a mix of for-profit (proprietary) and not-for-profit (non-proprietary) non-government and government-owned facilities. This diversity of delivery models offers an opportunity to compare services by facility ownership—information that is useful to provincial governments faced with rising health care costs and challenged to provide the best “value for money.”

Research, mainly in the United States, has found that not-for-profit ownership is associated with higher staffing levels,^{6,7} lower staff turnover,⁸ and better outcomes on a range of measures, compared with for-profit-ownership.^{5,7,9} While the results of American analyses are intriguing, differences in the market mix may limit the generalizability of such findings to Canada.

Only three Canadian studies have quantitatively examined associations between staffing levels and facility ownership.¹⁰⁻¹² Analyses in Ontario and British Columbia found that for-profit facilities employed fewer nursing staff than did not-for-profit facilities.^{10,12} By contrast, a Manitoba study reported no apparent differences in nursing staff levels between for-profit and not-for-profit facilities.¹¹

The seniors in long-term care facilities today tend to be older, more disabled and closer to the end of life than were residents a decade ago.¹³⁻¹⁵ This shift in the resident profile has placed new, more complex demands on staff. Yet despite these changes in the case mix of residents, data on nursing home staff have not been examined over time.

This analysis uses data from Statistics Canada's annual Residential Care

Facilities Survey to examine changes in staffing levels over the past decade in nursing homes in the province of British Columbia, by facility ownership.

Data and methods

Data source

Each year since 1974, Statistics Canada has conducted the Residential Care Facilities Survey (RCFS).¹⁶ The questionnaire has not changed appreciably since the inception of the survey and covers facility type and size, resident demographics, case mix and staffing. Copies are available on Statistics Canada's website (www.statcan.gc.ca).

Each March, the questionnaire is mailed to the director of care in every long-term care facility with at least four beds, which is licensed by the provincial/territorial department of health and/or social services, and whose financial statements are not embedded in those of an acute-care hospital. During the subsequent four months, reminders are mailed to non-respondents, and if possible, the survey is administered by telephone.

In this analysis, the study "population" consists of British Columbia facilities that self-identified as providing residential care mainly to the "aged," and that responded to the RCFS at least once between April 1, 1996 and March 31, 2007 (Table 1). The analysis excluded: facilities with fewer than 10 beds or housing mostly residents who required minimal assistance ($n=13$); facilities reporting 0 residents in a given year

($n=10$); and facilities reporting extreme outliers for total direct care hours per resident-day in a given year (three times greater or three times less than the standard deviation from the mean of the study population) ($n=132$). If a facility's total direct care hours per resident-day more than doubled or were reduced to less than half over two consecutive years with no corresponding change in ownership, this was considered to be a reporting error, and the response for the survey year in question was excluded ($n=66$).

Facility size was defined as the mean number of licensed and staffed beds. Facilities were divided into two ownership categories: for-profit and not-for-profit. The for-profit group consisted of institutions that self-identified as proprietary, and included smaller private organizations and chain corporations. Not-for-profit facilities were subdivided into non-government (owned and operated by religious or lay not-for-profit societies) and health-region-owned (owned and/or operated by a regional governance structure responsible for the continuum of health services for the defined geographic regions). Not-for-profit facilities were categorized this way because research has revealed significantly lower hospitalization rates for care-sensitive outcomes in facilities that are health-region-owned.¹⁷ At the beginning of the study period (1996), very few facilities were health-region-owned, but after the regionalization of health services in the late 1990s, the number increased substantially.

During the 1996-to-2006 period, the response rates to the RCFS were 56% for for-profit facilities, 77% for not-for-profit non-government facilities, and 66% for not-for-profit health-region-owned facilities. After the data exclusions, a total of 1,640 responses were analysed, representing 48% (577), 72% (781) and 51% (282) of the total potential responses for for-profit, not-for-profit non-government, and not-for-profit health-region-owned facilities, respectively (Table 1). The number of times facilities reported during the eleven-year period varied from 1 to 11, with 38% of facilities reporting 8 or more times.

Ethics approval for this study was obtained from the relevant academic and institutional ethics boards.

Measures

Staffing

Each facility's average number of paid hours per resident-day for every staff category (RN, LPN, care aide) was calculated by dividing the total reported number of paid hours in that staff category on March 31 of the survey year by the number of beds reported as being staffed and in operation, all divided by 365.25 days. For every year, mean RN hours per resident-day, total nursing (RN, LPN and care aide) hours per resident-day, RN hours as a proportion of total nursing hours, total therapist (occupational, physical and recreation therapy) hours per resident-day and activity aide hours per resident-day were calculated.

Table 1
Survey frame for Residential Care Facilities Survey, by ownership, British Columbia, 1996-to-2006 period

Long-term care facilities	Total		For-profit		Not-for-profit			
					Non-government		Health-region-owned	
	Facilities	Responses	Facilities	Responses	Facilities	Responses	Facilities	Responses
Surveyed	321	2 827	140	1 197	135	1 078	97	552
Responded at least once	281	1 861	111	667	127	828	86	366
Included in study	270	1 640	103	577	127	781	81	282

Notes: Because some facilities changed ownership during the 11-year period, the number by ownership type may not add to the total in each category. Hospital-based facilities were not included in the survey frame ($N=66$ in 1999, estimated from previous research¹⁸). Facilities excluded: fewer than 10 beds ($N=13$); reported 0 residents in a given year ($N=10$); total direct care hours per resident day $\pm$ 3 standard deviations from mean for study population ($N=132$); total direct care hours per resident day more than doubled or were reduced to less than half over two consecutive years with no change in ownership ($N=66$).

Source: 1996 to 2006 Residential Care Facilities Survey.

Resident characteristics

The sex of facility residents was measured as the percentage male. Age of residents was measured as the percentage 85 or older. A facility's case mix was calculated as the percentage of residents whose care level was at least Type III (defined as needing 24-hour availability of professional nursing care and supervision; medical management and/or therapeutic care required), grouped into four categories: 0%, 1% to 49%, 50% to 99%, and 100%. A facility's annual mortality rate was total deaths divided by the total number of residents in care the same year.

Analyses

Descriptive data for facility response rates were calculated by ownership and by demographic and case mix characteristics for each year. Descriptive data for all staffing measures were produced by year and stratified by ownership. Each staffing measure was tested for the effect of year to assess linear trends over time.

A random effects linear regression model (PROC GENMOD, SAS v9.1) was used to examine the adjusted effect of year and ownership on total nursing hours per resident-day. The regression models adjusted for resident demographics

(percentage male; percentage aged 85 or older), case mix (percentage of residents Type III or higher; annual mortality rate), and facility size (number of staffed and operating beds). Three separate regression models were produced: the first included survey year, the second included survey year and ownership; and the third included survey year, ownership, and the interaction of year and ownership.

To analyze the separate effect of the two types of not-for-profit ownership, the data for the adjusted models pertained to 1999 onward because there were very few health region-owned facilities before 1999. To be included in this analysis, facilities had to have responded to the RCFS at least twice in the 1999-to-2006 period.

Several tests were conducted to assess the robustness of results. Models were run with and without implementing the descriptive data exclusion rules. To assess the potential impact of frequency of response, the model was run to progressively exclude facilities responding less than three, four and five times during the period. In all cases, the direction and significance of the results were consistent with those reported in this study.

Results

Case mix

Between 1996 and 2006, the population of residents in British Columbia's nursing homes became older and frailer (Table 2). The percentage of residents aged 85 or older rose from 50% to 55%. The percentage of facilities with 100% of residents requiring Type III care or higher increased from 4% to 38%. The mean annual mortality rate of residents went from 11% to 17%.

Staffing levels

Trends in nursing home staffing levels differed by ownership (Table 3). In for-profit facilities, crude mean total nursing (RN, LPN and care aide) hours per resident-day increased from 1.95 (SD 0.62) in 1996 to 2.13 (SD 0.84) in 2006 ($p=0.06$). In not-for-profit non-government facilities, the increase was from 1.99 (SD 0.35) to 2.48 (SD 0.94) hours per resident-day ($p<0.001$), and in not-for-profit health-region-owned facilities, from 2.25 (SD 0.60) to 3.30 (SD 1.51) hours per resident-day ($p<0.001$). However, in each type of facility, RN hours as a proportion of total nursing hours did not change appreciably over the period, so the increases in total

Table 2
Case mix in long-term care facilities, British Columbia, 1996 to 2006

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Facilities											
Number	165	158	146	153	131	163	159	151	147	133	134
% of total surveyed	70.8	68.1	62.4	68.0	58.2	70.9	70.7	64.0	59.3	52.6	59.0
Residents aged 85 or older											
Mean proportion	0.50	0.52	0.51	0.54	0.54	0.54	0.54	0.55	0.52	0.54	0.55
Standard deviation	0.16	0.14	0.14	0.15	0.15	0.14	0.15	0.16	0.17	0.15	0.15
Male residents											
Mean proportion	0.30	0.29	0.28	0.27	0.28	0.28	0.27	0.28	0.29	0.28	0.29
Standard deviation	0.15	0.15	0.14	0.14	0.15	0.14	0.13	0.14	0.13	0.14	0.13
Mortality											
Mean annual rate*	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.16	0.17	0.17	0.17
Standard deviation	0.07	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.07	0.08	0.09
Facilities with all residents Type III[†] or higher[‡]											
Number	7	12	15	12	21	16	21	34	47	49	51
%	4.2	7.6	10.3	7.8	16.0	9.8	13.2	22.5	32.0	36.8	38.3

* total deaths divided by total residents in care in same year

[†] client needs 24-hour availability of professional nursing care and supervision, medical management and/or therapeutic care required

[‡] client needs 24-hour monitoring by professional nursing staff, but not resources of acute-care hospital

Source: 1996 to 2006 Residential Care Facilities Survey.

Table 3

Selected measures of nursing hours in long-term care facilities, by ownership, British Columbia, 1996 to 2006

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	Linear regression coefficient for year of survey	95% confidence interval from	to
Total nursing¹ hours per resident-day														
For-profit														
Mean number	1.95	2.04	2.11	2.13	2.10	2.17	2.17	2.26	2.18	2.33	2.13	0.023	-0.001	0.047
Standard deviation	0.62	0.49	0.61	0.54	0.52	0.71	0.63	0.73	0.76	0.76	0.84	...	...	...
Not-for-profit non-government														
Mean number	1.99	2.05	2.18	2.27	2.34	2.36	2.36	2.37	2.37	2.58	2.48	0.051***	0.031	0.071
Standard deviation	0.35	0.33	0.54	0.64	0.63	0.61	0.57	0.78	0.66	0.78	0.94	...	...	...
Not-for-profit health-region-owned														
Mean number	2.25	2.25	2.22	2.23	2.12	2.23	2.17	2.72	3.05	2.98	3.30	0.142***	0.092	0.191
Standard deviation	0.60	0.89	0.53	0.72	0.54	0.49	0.50	0.80	0.86	0.63	1.51	...	...	...
Registered nurse (RN) hours per resident-day														
For-profit														
Mean number	0.51	0.58	0.58	0.63	0.57	0.59	0.50	0.52	0.46	0.45	0.43	-0.014***	-0.022	-0.007
Standard deviation	0.23	0.20	0.24	0.35	0.20	0.42	0.18	0.20	0.20	0.18	0.25	...	...	...
Not-for-profit non-government														
Mean number	0.51	0.54	0.61	0.59	0.62	0.59	0.57	0.59	0.55	0.56	0.52	-0.0004	-0.007	0.006
Standard deviation	0.13	0.12	0.32	0.18	0.17	0.17	0.17	0.32	0.20	0.25	0.21	...	...	...
Not-for-profit health-region-owned														
Mean number	0.47	0.47	0.53	0.52	0.56	0.51	0.49	0.49	0.54	0.54	0.56	0.005	-0.008	0.019
Standard deviation	0.09	0.13	0.20	0.17	0.21	0.37	0.33	0.26	0.27	0.31	0.36	...	...	...
Registered nurse (RN) hours/Total nursing¹ hours														
For-profit														
Mean proportion	0.27	0.28	0.28	0.30	0.27	0.29	0.24	0.23	0.26	0.24	0.27	-0.004	-0.010	0.002
Standard deviation	0.10	0.07	0.12	0.15	0.07	0.18	0.07	0.08	0.22	0.19	0.28	...	...	...
Not-for-profit non-government														
Mean proportion	0.26	0.27	0.29	0.27	0.28	0.26	0.26	0.25	0.25	0.24	0.28	-0.002	-0.007	0.003
Standard deviation	0.09	0.05	0.14	0.07	0.07	0.07	0.11	0.12	0.15	0.16	0.26	...	...	...
Not-for-profit health-region-owned														
Mean proportion	0.22	0.22	0.28	0.25	0.28	0.23	0.23	0.20	0.21	0.19	0.28	-0.004	-0.012	0.006
Standard deviation	0.07	0.08	0.23	0.11	0.14	0.18	0.16	0.12	0.16	0.11	0.31	...	...	...
Total therapist² and activity aide hours per resident-day														
For-profit														
Mean number	0.15	0.14	0.14	0.14	0.14	0.12	0.11	0.12	0.10	0.11	0.12	-0.004**	-0.007	-0.001
Standard deviation	0.13	0.05	0.07	0.06	0.05	0.06	0.05	0.06	0.06	0.07	0.07	...	...	...
Not-for-profit non-government														
Mean number	0.19	0.17	0.19	0.18	0.19	0.18	0.17	0.17	0.20	0.18	0.18	-0.001	-0.005	0.004
Standard deviation	0.15	0.08	0.19	0.08	0.08	0.08	0.09	0.08	0.25	0.09	0.10	...	...	...
Not-for-profit health-region-owned														
Mean number	0.20	0.10	0.15	0.27	0.31	0.22	0.21	0.23	0.22	0.20	0.22	-0.001	-0.014	0.012
Standard deviation	0.14	0.08	0.09	0.38	0.43	0.08	0.11	0.09	0.14	0.14	0.13	...	...	...

** p<0.01, *** p<0.001

¹ registered nurses, licensed practical nurses, care aides² occupational, physical and recreation therapy

... not applicable

Source: 1996 to 2006 Residential Care Facilities Survey.

nursing hours per resident-day were almost entirely the result of increases in non-RN hours.

Total therapist/activity aide hours per resident-day decreased in for-profit facilities, but remained stable in both types of not-for-profit facilities.

Adjusted effect of year and ownership

When adjusting for resident demographics, case mix, mortality rate and facility size, there was a significant positive effect of year on mean total nursing hours per resident-day across the

period (Table 4, Model 1). Compared with for-profit facilities, total nursing hours per resident-day were significantly higher in both types of not-for-profit facilities in the adjusted model (Table 4, Model 2). Finally, the rate of increase across time in total nursing hours per

Table 4**Linear regression models for adjusted effect of year, facility ownership, and year x ownership on mean total nursing hours per resident-day in long-term care facilities,[†] British Columbia, 1999 to 2006**

	Model 1 [‡]			Model 2 [‡]			Model 3 [‡]		
	Regression coefficient [§]	95% confidence interval		Regression coefficient [§]	95% confidence interval		Regression coefficient [§]	95% confidence interval	
		from	to		from	to		from	to
Year	0.039**	0.012	0.066	0.037**	0.010	0.064	0.004	-0.034	0.042
Ownership (reference=for-profit)									
Not-for-profit non-government	—	—	—	0.249**	0.064	0.434	0.184	-0.168	0.536
Not-for-profit health-region-owned	—	—	—	0.472***	0.279	0.666	-0.677*	-1.232	-0.123
Interaction (year x ownership)									
Year x not-for-profit non-government	—	—	—	—	—	—	0.008	-0.039	0.054
Year x not-for-profit health-region-owned	—	—	—	—	—	—	0.153***	0.076	0.230

* p<0.05, **p<0.01, ***p<0.001

[†] N=233 facilities (1,073 survey responses)[‡] adjusted for population mean values of % male residents, % residents aged 85 or older, % residents Type III or higher, annual mortality rate, and facility size[§] excludes 30 facilities responding only once in 1999-to-2006 period

not applicable

Source: 1996 to 2006 Residential Care Facilities Survey.

resident-day was significantly greater for not-for-profit health-region-owned facilities, compared with for-profit facilities (Table 4, Model 3).

By 2006, not-for-profit health-region-owned facilities had an adjusted estimate of 61 more minutes per resident-day and not-for-profit non-government-owned facilities, 16 more minutes per resident-day, compared with for-profit facilities (Table 5).

Discussion

With data from Statistics Canada's Residential Care Facilities Survey, this study traced trends in staffing levels in British Columbia's nursing homes from 1996 to 2006. The estimates of total nursing hours per resident-day are similar to levels reported for Ontario.¹⁰

but substantially below those in a cross-sectional British Columbia study.¹² This may reflect the data sources: the Ontario estimates were based on the same source as the current study (the RCFS), whereas the British Columbia study used data submitted to the province's Labour Relations Board by union and management before a contract dispute.

This analysis shows that since 1996, total nursing hours per resident-day rose for all three facility ownership groups, but increases in RN (the most highly trained staff) hours were negligible. That RN hours in British Columbia did not rise during a period of increasing resident clinical complexity is of particular note, given evidence of a link between RN staffing levels and quality of care.^{3,4,17}

Consistent with earlier research,^{6,7,9,10,12} total adjusted nursing hours per

resident-day in British Columbia were significantly lower in for-profit facilities, compared with the two not-for-profit groups. One explanation may be the institutional mandate. Staff constitute one of the largest expenditure categories, so lowering costs by reducing staff time is a means of increasing profits.^{19,20} Moreover, British Columbia has no formal regulation of minimum staffing levels, so facilities have some leeway in deciding what is appropriate, thereby enabling such a difference to persist.

Previous research in British Columbia¹⁸ found lower hospital admission rates for a number of care-sensitive diagnoses in health-region-owned facilities, compared with both for-profit facilities and not-for-profit non-government facilities. The dramatically higher total nursing hours per resident-day in health region-owned facilities in the current study suggests that staffing levels may be one element driving these improved outcomes.

The high total nursing hours per resident-day in not-for-profit health-region-owned facilities is consistent with findings from Ontario,¹⁰ but not Manitoba where staffing levels were found to be uniform for all ownership groups.¹¹

While the difference in nursing hours per resident-day in for-profit and not-for-profit non-government facilities is statistically significant, the magnitude of the difference is small and may be

Table 5**Estimated difference in mean total nursing minutes per resident-day in long-term care facilities,[†] by facility ownership and year, British Columbia, 1999 to 2006**

Ownership	1999	2000	2001	2002	2003	2004	2005	2006
	(minutes per resident-day)							
Non-profit non-government	12.6	13.2	13.8	14.4	15.0	15.0	15.6	16.2
Non-profit health-region-owned	-3.6	5.4	14.4	24.0	33.0	42.0	51.0	60.6

[†] N=233 facilities (1,073 survey responses)

Notes: Random effects linear regression models adjusted for population mean values of % male residents, % residents aged 85 or older, % residents Type III or higher, mortality rate, and facility size. Reference category is for-profit. Models exclude 30 facilities that responded only once in the 1999-to-2006 period.

Source: 1996 to 2006 Residential Care Facilities Survey.

What is already known on this subject?

- American studies have found that not-for-profit ownership of nursing homes is associated with higher staffing levels, lower staff turnover, and better outcomes on a range of measures, compared with for-profit ownership.
- Differences in the market mix may limit the generalizability of American findings to Canada.
- Only three Canadian studies have quantitatively examined associations between long-term care facility staffing levels and facility ownership, and the results have not been consistent.
- Seniors living in long-term care facilities today are older, more disabled and closer to the end of life than were residents a decade ago, but data on nursing home staff have not been examined over time.

What does this study add?

- Total nursing hours per resident day have increased over the past decade for all facility ownership groups in British Columbia.
- The rate of increase in not-for-profit facilities owned by a health region was significantly greater compared with for-profit facilities.
- Total nursing hours per resident day were also significantly lower in for-profit facilities, compared with not-for-profit facilities.

of questionable clinical significance. Nonetheless, given previous research demonstrating that one toileting episode takes approximately eight minutes,²¹ even fairly small increases in nursing staff time may add meaningful quality to residents' lives.

Regardless of facility ownership, total nursing hours per resident-day in this study (2.13 to 3.30 hours) were below

current recommendations.^{2,22} The U.S. Centers for Medicare and Medicaid determined that 4.1 hours per resident-day (combined 2.8 hours for non-licensed and 1.3 hours for licensed) was the threshold below which poorer outcomes such as weight loss and pressure ulcers were more likely to occur.²

Limitations

This study has a number of limitations. Although the initial survey response rate was relatively good, outliers and inconsistent responses across time were concerns. Consequently, these data were excluded from the analysis. The regression models were run with and without these exclusions, and the significance and direction of the effect estimates were unchanged, but it is still possible that some bias was introduced by the decision rules.

A second limitation is the potential inclusion in the dataset of a small number of privately financed user-pay for-profit facilities. However, this subgroup represents fewer than 5% of facilities in British Columbia and is unlikely to have influenced the overall results.

A third limitation is that case mix adjustment was done at the facility level, not the resident level. Therefore, it was not possible to determine if the differences in staffing were due to differences in the underlying case mix of residents not captured by the facility-level data.

Another limitation is that while the outcome was staffing hours per resident-day, staffing hours per bed-day were measured, based on the assumption that facilities were operating at 100% capacity and that residents were always on site (versus in hospital, for example). The former assumption is reasonable given the long waitlists for admission to residential care facilities in most health regions. However, if occupancy rates differed across facilities by ownership, staffing hours per resident-day may have spuriously appeared lower or higher than they actually were.

Finally, staffing levels are only one measure of quality. Other staff-related measures such as the turnover rate,²³ and

management practices²⁴ have been found to be highly correlated with the quality of care.

Conclusion

While total nursing hours per resident-day in all long-term residential care facility groups in British Columbia have increased over time, the percentage of RN hours did not rise substantially. As well, the rate of increase in nursing hours per resident-day varied considerably by ownership. Increases in staffing since 1996 were much greater in not-for-profit facilities operated by regional health authorities than in for-profit facilities and not-for-profit non-government facilities. ■

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